# PC Emulator
User Guide

Acorn

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Contents

About this Guide

Introduction

The PC Emulator allows standard DOS applications to be run on a RISC OS computer. It does this by emulating the hardware of an IBM PC compatible computer and then running a standard copy of DOS on this emulated hardware.

The initials DOS stand for Disc Operating System – the PC Emulator's operating system. The version of DOS used with this version of the PC Emulator is DR DOS 6.0.

This Guide is not a DOS tutorial. It only describes how to install and run the PC Emulator and explains those DOS utilities that are specific to the PC Emulator.

The PC Emulator package

The PC Emulator package contains:

- The PC Emulator disc containing the multitasking PC emulator (called *Multitasking* CGA/EGA/VGA) and the single-tasking PC emulator (called *Single tasking* CGA).
- This manual.
- The DR DOS 6.0 discs.
- The DR DOS 6.0 documentation.

The DR DOS 6.0 discs contain the DR DOS operating system and standard DOS utilities. It also includes Acorn specific DOS utilities that are for use with the PC Emulator.

Viewing DOS files

You can use the RISC OS 3 Filer to view and manipulate files stored on DOS format floppy discs on the DOS hard disc file. For more information read the chapter entitled *Using* DOS *files with the* RISC OS *Filer* on page 33.

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Reporting problems

If you have problems running software on the Acorn PC Emulator which you have used successfully on a PC clone, please let us know. Write to Acorn Customer Services, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, giving details of the software, the PC clone (make, memory, graphics cards, etc), the version of DOS used, and how you have configured the PC Emulator. Please write 'PC Emulator' on the outside of the envelope.

If you have any comments on this manual, please complete the form at the back of the manual, and send it to the address given there.

Installing the PC Emulator

This chapter describes how to install the PC Emulator on your computer. Installation is necessary to tailor the emulator to suit your requirements and the configuration of your system. You can run the PC Emulator from floppy discs, or, if your computer has one, from a hard disc. This chapter tells you how to install the emulator either way.

Before starting

Before you start this chapter you must decide which version of the emulator you are going to use. Which one you use will depend on the memory size of your computer. The multitasking version needs at least 2MB of memory, while the single-tasking version can operate with 1MB.

Multitasking or single tasking

!PCEm The multitasking PC Emulator runs in a window on the RISC OS desktop simultaneously with other RISC OS applications. It also has a 'Single Task' mode of operation in which the emulator takes over the whole screen. In 'Single Task' mode, the emulator runs faster and the computer appears to be an IBM PC clone running DOS.

Multitasking requires at least 2MB of memory to run. With only 2MB you may not be able to use all the VGA screen modes and still have 640k of PC memory.

!PCEmS The single-tasking PC Emulator is a reduced version of the emulator for use with computers that have only 1MB of memory. This version only operates in full screen (Single Task) mode; it does not operate in a window. Additionally, it only emulates the Colour Graphics Adaptor (CGA) display.

You should choose which of these versions you are going to use before you start the installation. The instructions in this guide refer to the program names for the emulators; PCEm is the multitasking emulator and PCEmS is the single-tasking emulator.

The emulator does not operate in a computer with less than 1MB of memory.

Monitor requirements

If you choose the multitasking emulator, you can configure the emulator to use certain screen modes. However you may be limited by the capabilities of your monitor. If your computer has a medium resolution RGB monitor, we recommend that the emulator be configured to emulate either CGA or EGA CD.

If your computer has a VGA or multiscan monitor we recommend that the emulator be configured to emulate either EGA ECD or VGA. It is not possible to use the single-tasking mode with EGA ECD or VGA emulation on a medium resolution RGB monitor.

You will find out how to configure your monitor type during the floppy and hard disc installation procedure.

Making backups

If you plan to run the emulator from floppy discs, you should make a backup of the PC Emulator disc and use this backup as your working disc.

The PC Emulator disc should be backed up like any other RISC OS floppy disc. The procedure is described in your *Welcome Guide* and the RISC OS 3 *User Guide*. The DR DOS installation procedure makes its own set of working discs if you are installing onto floppy disc. This procedure is described in the next section.

Saving DOS files on floppy discs

The emulator can only save files on floppy discs that have previously been formatted by DOS. To format a disc, use the DOS FORMAT command. For more information on using the FORMAT command, see the chapter entitled DR DOS *commands* on page 45.

Floppy disc installation

If you intend to run the emulator from your floppy disc drive, follow these instructions (hard disc instructions are on page 8):

There are three main stages in this procedure:

1 Choosing which emulator version to use.

2 Loading the emulator.

3 Configuring the emulator.

4 Installing DR DOS.

Choosing the emulator version

Decide which version of the emulator you are going to use. The multitasking emulator is called !PCEm. The single-tasking emulator is called !PCEmS.

● If you have only 1MB of memory in your computer you must use the single-tasking emulator.

● If you have 2MB of memory you can use either emulator. Some of the multitasking emulator modes may not be available due to lack of memory.

Loading the emulator

1 Insert the PC Emulator disc into the floppy drive and click on the floppy disc icon. This displays the contents of the disc.

2 Double-click on the emulator application, !PCEm (multitasking) or !PCEmS (single tasking) to load it onto the icon bar.

Configuring the emulator

This section lets you configure the emulator according to the hardware you are using.

The configuration dialogue box is displayed by choosing the **Configuration** option from the icon bar menu. This option allows you to change details about the actual PC that is emulated. The configuration menu can only be accessed when the emulator is loaded but not running.

If you change any of the options, the changes do not take effect until you have saved them by clicking on **OK** in the **Save as** box.

Configuring the single-tasking emulator PCEmS

If you are using a computer with only 1MB of memory you must click on the **Erase RISC OS?** option otherwise the emulator will not install correctly. If you use this option, the only way to return to RISC OS is to restart the computer.

You should not need to change any of the other options in the configuration menu before you install the emulator. The configuration can also be changed after the installation. For a full explanation of all the options in the configuration dialogue box turn to the chapter entitled *Configuring the* PC *Emulator* on page 23.

Configuring the multitasking emulator PCEm

You can only use the multitasking emulator if your computer has at least 2MB of memory.

4

If you are using an Acorn AKF30 monitor (or similar) you should not
choose the **VGA** display option and the **Single task** option together.
If you wish to use **Single task** option, you should choose the **EGA**
display adaptor option together with a **CD** monitor and **128K**
memory. Single task operation is explained on page 1.

You should not need to change any of the other options in the
configuration menu before you install the emulator. The
configuration can also be changed after the installation. For a full
explanation of all the options in the configuration dialogue box turn
to the chapter entitled *Configuring the* PC *Emulator* on page 23.

Installing DR DOS onto floppy disc

The DR DOS installation program consists of a number of screens to
read and follow. If at any time during the installation you make a
mistake, you can press Esc to go back to the previous screen, or F10
to stop the installation.

5

This installation procedure assumes that you are setting up DR DOS for the first time. If you wish to **alter** your set-up, refer to the DR DOS documentation.

The installation requires three blank floppy discs.

1   Click on the PC emulator icon on the icon bar.

If the **Erase RISC OS?** option has been set, a warning box will appear to remind you that the desktop will be cleared and you will loose any unsaved work. If you wish to continue, click on the **OK** box.

After a while the following message appears:

```
Acorn PC Emulator, (C) Acorn 1991
Insert DOS boot disk and press any key
```

2   At the `Insert DOS boot disk and press any key` prompt, take out the emulator disc, replace it with the DR DOS Startup disc and press the space bar. DR DOS starts up and displays the installation start-up page.

3   At the DR DOS Welcome screen, press Return when you have read the screen.

4   If you have a hard disc, but wish to run DOS from a floppy, use the down arrow key to select the floppy disc A:, then press Return. If you just have a floppy disc press Return.

5   Press Return again to accept a balanced configuration between functionality and memory.

6   The country and keyboard settings are correctly defined by default. Press Return to accept United States as the country, US English as the keyboard and the enhanced keyboard option.

7   You can at this stage set up other parameters. Refer to the DR DOS documentation for further details. However, if your are installing for the first time you should accept the default set-up by using the up arrow key to highlight the option:

```
Skip configuration and go directly to
installation.
```

Press Return to continue with the installation.

8 At the prompt follow the set-up instructions displayed on the screen to create working copies from your original Startup, Utilities-1 and Utilities-2 discs. You may have to swap discs several times. The program will automatically format the backup discs (if necessary) before writing to them; this may take a little time, during which nothing very much will appear to be happening.

9 Once the system is installed, insert your new copy of the Startup disc and reboot the PC Emulator by pressing Return to accept the Reboot Computer option. When DOS has restarted, the DOS command line prompt will be displayed, and you can use your computer as a DOS machine.

You now have a complete DOS system installed on your floppy disc. From now on you do not need the master DR DOS floppy discs; keep the master discs as backups in case your disc is corrupted at any time. You can now turn to the chapter entitled *Running the* PC *Emulator* on page 17.

Hard disc installation

This section explains how to install the emulator on a computer with a hard disc. There are four main stages in this procedure:

1   Choosing which emulator version to use.

2   Copying the emulator applications onto the hard disc.

3   Creating a DOS partition on your hard disc.

4   Installing DOS on your DOS hard disc.

Choosing the emulator version

Decide which version of the emulator you are going to use. The multitasking emulator is called !PCEm. The single-tasking emulator is called !PCEmS.

● If you have only 1MB of memory in your computer you must use the single-tasking emulator.

● If you have 2MB of memory you can use either emulator. Some of the multitasking emulator modes may not be available due to lack of memory.

● If you have 4MB (or more) of memory you can use either emulator.

Copying the emulator onto a hard disc

Copy the emulator files to a new directory on your hard disc as follows:

1   Insert the PC emulator disc into the floppy drive and click on the floppy disc icon. This displays the contents of the disc.

2   Make a new directory in the root directory of your hard disc (use the **New directory** option on the Filer menu). It is recommended that you name this directory PC. Copy into it the emulator application (!PCEm or !PCEmS).

Configuring the emulator

This section lets you configure the emulator according to the hardware you are using.

8

The configuration dialogue box is displayed by choosing the
Configuration option from the icon bar menu. This option allows
you to change details about the actual PC that is emulated. The
configuration can only be accessed when the emulator is loaded but
not running.
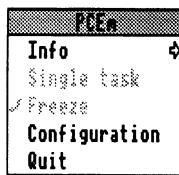
If you change any of the options, the changes do not take effect until
you have saved them by clicking on **OK** in the **Save as** box.

Configuring the single-tasking emulator PCEmS

If you are using a computer with only 1MB of memory you must click
on the **Erase RISC OS?** option otherwise the emulator will not
install correctly. If you use this option, the only way to return to
RISC OS is to restart the computer.
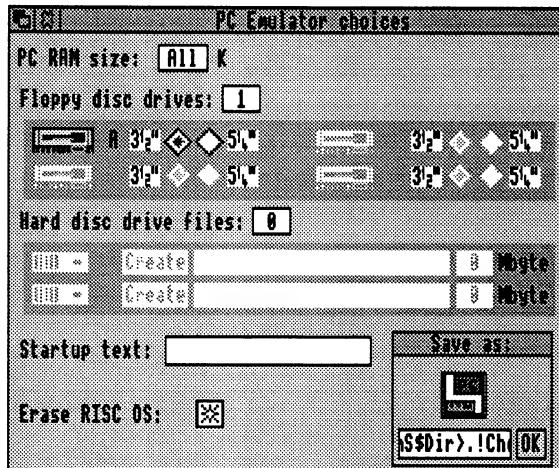
You can now create the DOS hard disc file; turn to page 10.

9

Configuring the multitasking emulator PCEm

You can only use the multitasking emulator if your computer has at least 2MB of memory.

If you are using an Acorn AKF30 monitor (or similar) you should not choose the **VGA** display option and the **Single task** option together. If you wish to use **Single task** option, you should choose the **EGA** display adaptor option together with a **CD** monitor and **128K** memory. Single task operation is explained on page 1.
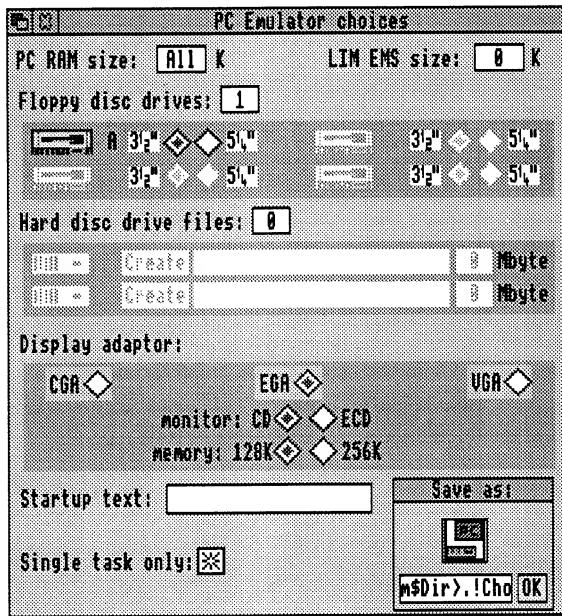
Creating a DOS hard disc file

The emulator does not have its own hard disc; instead it uses a special RISC OS file as a simulated hard disc. In this section, when we refer to the DOS hard disc, we are really referring to this file. However, in DOS terms, this file looks and behaves like a proper DOS hard disc drive.

1 If you do not already have the configuration dialogue box on the screen choose the **Configuration** option from the icon bar menu.

2 Click Select over the number next to **Hard disc drive files**; this changes the number to 1. (Clicking Adjust decreases the number). The default file name adfs::4.$.PC.Drive_C is displayed. This creates a file named Drive_C in the PC directory.

Click here to add a disc.

Type the disc size in here.

Type in the required pathname here.
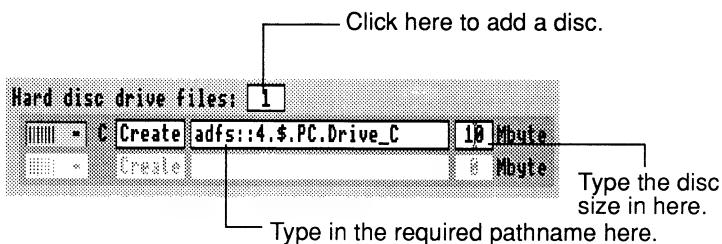
If you have stored your emulator files in a different directory or wish to create a differently named file, erase this and type in a suitable RISC OS name.

If you have an Acorn SCSI disc drive you should change the file name to one beginning SCSI::. For example the default on a computer with an Acorn SCSI disc drive would be

SCSI::4.$.PC.Drive_C.

Hard disc expansion cards from third party manufacturers may use different filing systems. Consult the manufacturer's manual for more information.

3 Type in the size (in Megabytes) for the DOS hard disc file. A minimum size of 4MB is recommended.

It is not possible to change (increase or decrease) the size of an existing DOS hard disc file. If you need a different size, you must first delete the old one (using the RISC OS Filer) and re-create one of a different size. All of your data will be lost, so any important data that you want to keep from the old DOS hard disc file should be first copied onto floppy disc, so that it can then be transferred to the new DOS hard disc file.

11

4   Create the hard disc partition by clicking on the word **Create**. This creates an unformatted DOS hard disc which DR DOS will format.

Type the disc size in here.

Click here to create the DOS disc.
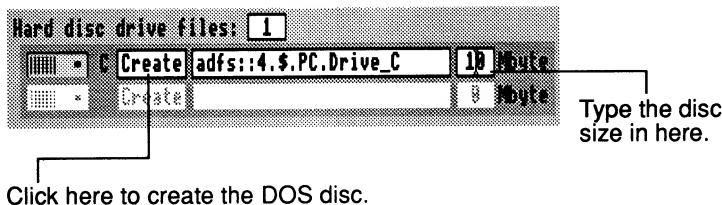
5   Save the configuration by clicking on **OK** in the **Save as** box.

You should not need to change any of the other options in the configuration menu. The configuration can also be changed after the installation. For a full explanation of all the options in the configuration dialogue box turn to the chapter entitled *Configuring the* PC E*mulator* on page 23.

Installing DR DOS on a hard disc

1   If you have not already done so, double-click on the emulator application (!PCEm or !PCEmS) to load it onto the icon bar.

2   Click on the PC icon.

If the **Erase RISC OS?** option has been set, a warning box will appear to remind you that the desktop will be cleared and you will loose any unsaved work. If you wish to continue, click on the **OK** box.

After a while the following Error message appears:

```
Warning, Booting from non DOS harddisc.
Use <ctrl><alt><del> to reboot if
required.
```

3   Insert the DR DOS Startup disc and click on the OK box. If you are using the Erase RISC OS? option, insert the DR DOS Startup disc and press any key.

4   Wait for a few moments and the DR DOS installation menu is displayed on the screen. The DR DOS install menus will guide you through the installation procedure.

    DR DOS installation consists of a number of screens to read and follow. If at any time during the installation you make a mistake, you can press Esc to go back to the previous screen or F10 to stop the installation.

    This installation procedure assumes that you are setting up DR DOS on the hard disc for the first time. If you wish to alter your set-up, refer to the DR DOS documentation.

5   At the DR DOS Welcome screen, press Return when you have read the screen.

6   The next screen asks you if you wish to prepare the hard disc you have just created. Press the down arrow to select `YES`, and press Return.

7   The following FDISK message will be displayed:

```
1st hard disk sector zero has no boot
sector id. Initialize disk [Y/N]?
```
    Type `Y` to start the partitioning process.

8   Type 1 to create a DOS partition.

9   Type 1 to create a DOS primary partition.

10 When the message

```
Use cylinder X-XX for DOS (X.XMB) (Y/N)
```
    is displayed, type `Y` to start partitioning.

11 Enter a disc label (a name for the disc), if you want to, then press Return.

12 Press Esc to leave the FDISK utility.

13

13 When you see the message:

```
The operating system needs to be reloaded
Insert a system disc into A: and strike a key
```
Make sure your DR DOS Startup disc is in the floppy drive, then press any key. If you have used the Erase RISC OS? option you will have to restart DR DOS by holding down the Ctrl, Alt and Delete keys together.

14 When you are back at the Welcome screen, press Return.

15 To select the hard disc partition C: as the location to install DOS, press Return again.

16 Press Return again to accept a balanced configuration between functionality and memory.

17 The country and keyboard settings are correctly defined by default. Press Return to accept United States as the country, US English as the keyboard and the enhanced keyboard option.

18 Press Return to accept the installation of the DR DOS utilities in the C:\DRDOS subdirectory.

19 Press the down arrow to highlight the

```
Replace all DOS files on the destination
drive.
```
option, then press Return.

20 You can at this stage set up further parameters. Refer to the DR DOS documentation for further details. However, if you are installing DR DOS for the first time, it is advisable to accept the default set-up for now by using the up arrow key to highlight the

```
Skip configuration and go directly to
installation
```
option, then press Return.

21 Unless you want to review or change any choices at this stage, press Return to continue with the installation. Screen messages will inform you of the progress of the installation, and you will be prompted to swap discs.

22 At the prompt follow the set-up instructions displayed on the screen to copy the original Startup, Utilities-1 and Utilities-2 discs to the hard disc.

23 Once the system is installed, remove the floppy disc from the drive and reboot the PC Emulator by pressing Return to accept the Reboot Computer option.

You now have a complete DOS system installed on your hard disc. From now on, you do not need the floppy discs, except as backups in case your hard disc is corrupted at any time.

Running the PC Emulator

Before you run either version of the emulator, you should first install the program as described in the chapter *Installing the* PC *Emulator*. This sets up the emulator to suit your particular system configuration, and makes a working copy of it on either floppy or hard disc (if you have one). You should run the emulator from this working copy.

The following section describes the multitasking emulator. The single-tasking emulator is described on page 19 onwards.

Running the multitasking emulator

To run the PC Emulator:

1   Display the directory window containing the PC Emulator. If you have a floppy disc system do this by inserting the PC Emulator floppy disc in the disc drive and then by clicking on the floppy disc icon.

2   Double-click on the PCEm icon in the directory display. This loads the emulator onto the icon bar.

3   Click on the PCEm icon on the icon bar. This displays the PC screen in a window.

4   If you do not have a DOS hard disc you should insert the DOS system disc and press any key.

5   The emulator may ask you for the date and time. Press Return at each prompt (unless you want to change either of these).

6   When the PC has finished starting up you will see an A> prompt, representing the floppy disc drive.

Hard disc users

If you have a correctly set-up DOS hard disc it will boot DOS
automatically as long as the floppy disc drive is empty. When the
emulator has finished starting, you will see a C> prompt
representing the hard disc drive.

The window menu options

Display the emulator menu options by clicking Menu (the middle
mouse button) over the PC emulator window. The emulator window
menu is only available if you are using the emulator in a window. To
move from full screen to windowed mode click Menu.

```
       EGA
 Save screen    ⇨
 Save text      ⇨
 Connect mouse
```
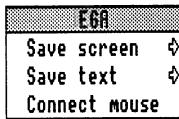
Save screen

This option allows you to save a screenful of data to a RISC OS
sprite file. Sprite files cannot be converted to text files.

Save text

This option allows you to save a screen as a text file, if you are in a
text mode.

Connect mouse

This option allows the PC window to use the mouse. You may also
have to run AMOUSE.COM; see the section entitled *The mouse driver*
on page 39 for details. When the mouse is 'connected' it will drive
the PC mouse pointer. Click Menu again to reconnect the mouse to
the RISC OS mouse pointer.

Quitting the emulator

To exit the emulator, choose the **Quit** option from the emulator icon
bar menu.

Warning: Any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore this option should normally only be used when the PC Emulator is at the DOS prompt.

Running the single-tasking emulator

To run the reduced memory version of the PC Emulator:

1   Display the directory window containing the PC Emulator. If you have a floppy disc system do this by inserting the PC Emulator floppy disc in the disc drive and then by clicking on the floppy disc icon.

2   Double-click on the PCEmS icon in the directory display. This loads the emulator onto the icon bar.

3   Click on the PCEmS icon on the icon bar. This displays the PC screen.

This will cause all RISC OS tasks to be suspended and the emulator to run in single task mode. You can return to RISC OS, without losing your PC data, by clicking the middle mouse button (if the configuration option **Erase RISC OS?** has not been chosen). Click on the emulator icon again to redisplay the PC screen.

4   If you do not have a DOS hard disc you should insert your copy of the DOS floppy disc and press any key.

5   When the emulator has finished booting you will see an A> prompt, which represents the floppy disc drive.

Hard disc users

If you have a correctly set-up DOS hard disc, it will boot DOS automatically as long as the floppy disc drive is empty. When the PC has finished booting you will see a C> prompt, representing the hard disc drive.

Quitting the emulator

If you have not set the Configuration option **Erase RISC OS?**, you can switch to the RISC OS desktop by clicking the Menu button on the mouse. Click on the PC icon bar icon to get back to DOS.

Exit the emulator altogether by choosing the **Quit** option from the emulator icon bar menu.

If you **have** set the Configuration option **Erase RISC OS?**, you must hold down Ctrl and press the Reset button to exit the emulator. This restarts the whole computer.

Warning: When you quit the PC Emulator, any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore you should normally only quit the PC Emulator when the DOS prompt is displayed.

PC Emulator icon bar menu options

The following options appear on the PC emulator icon bar menu. Click Menu over the emulator icon to display them. If you are using the single-tasking emulator, the Freeze and Single task options are not available to you.
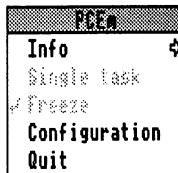
Info

This gives the version number of the PC Emulator application.

Single task (multitasking emulator only)

Clicking on this option causes the PC Emulator to use the whole screen, instead of operating in a RISC OS window. To return to window mode, click Menu.

No other RISC OS tasks run while the PC Emulator is in Single task mode. However, the RISC OS desktop will be restored as it was when you return to windowed mode. The RISC OS tasks that were running will now start again.

When running in Single task mode, the emulator will run slightly faster. Screen updates in particular will be faster and mouse movement smoother.

Freeze (multitasking emulator only)

Clicking on this option causes the emulation to freeze. This option can be used to pause the PC Emulator while doing work in other RISC OS windows. Click on this option again to restart the emulator.

The emulator will automatically freeze when the emulator window is closed (by clicking on the close icon). Unfreeze and open the emulator window by clicking on the emulator icon.

Configuration

Clicking on this option displays a dialogue box that allows the details of the emulated PC to be specified. This dialogue box is described in detail in the section entitled *The configuration dialogue box* on page 23.

A suitable configuration must be set up before DOS is run. You cannot reconfigure the emulator while it is running. You must first quit the emulator by choosing **Quit** from the icon bar menu and then reloading it. The Configuration option will then be available on the icon bar menu.

Quit

Clicking on this option causes the emulator to quit.

Warning: Any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore this option should normally only be used when the PC Emulator is at the DOS prompt.

Configuring the PC Emulator

This chapter explains how to configure the emulator further to suit your requirements.

The configuration dialogue box

The configuration dialogue box is displayed by choosing the **Configuration** option from the icon bar menu. This option allows you to change details about the actual PC that is emulated. The configuration menu can only be accessed when the emulator is loaded but not running.

If you change any of the options, the changes do not take effect until you have saved them by clicking on **OK** in the **Save as** box. The configuration options are saved, in plain text, in a file called **!Choices** in the emulator application directory.
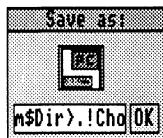
The !Choices file is kept within the emulator's application directory. If you want to view this file, open the emulator application directory (hold down the shift key and double-click on the emulator icon) and then drag the !Choices file to the Edit icon (on the icon bar)
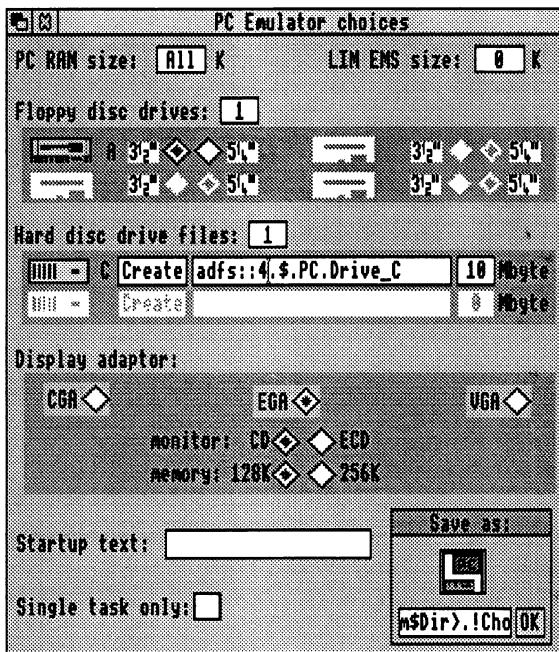
PC RAM size

This option specifies the amount of RAM that the emulated PC can use, up to a maximum of 640K. The default setting is **All**, which means that the PC Emulator will emulate a PC with as much memory as possible, up to a maximum of 640K.

If there is insufficient memory available when the PC Emulator is loaded, a warning message is displayed and the emulator icon is removed from the icon bar.

LIM EMS size (multitasking only)

This option specifies the amount of expanded memory (memory above the conventional 640K limit) that can be used by programs and applications. Only programs specifically designed to use expanded memory can make use of this memory area.

To use expanded memory you need to have the file EMS.SYS loaded. To do this add the line DEVICE=EMS.SYS to your CONFIG.SYS file by typing:

```
ECHO DEVICE=EMS.SYS >> C:\CONFIG.SYS
```

(If you don't have a CONFIG.SYS file it will create one for you). You will also need to have the file EMS.SYS in the root (C:\) directory.

EMS.SYS is an expanded memory device driver especially for the PC Emulator. It is supplied on the DR DOS discs.

Floppy disc drives

Click Select on the number (next to the title) to add disc drives (click Adjust to remove them). If you have a 5 1/4" drive attached make sure you click on the appropriate 5 1/4" button.

You should not configure more floppy drives than there are real physical floppy disc drives. If you want your DOS hard disc drive to be called C:, reduce the number of configured floppy drives to one or two.

Click here to add a floppy disc.

Choose the disc type here.

25
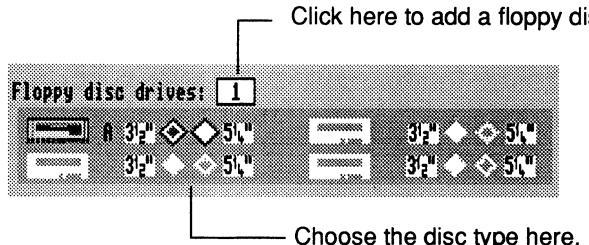
Hard disc drive files

Click Select on the number (next to the title) to add hard disc drives (click Adjust to remove them). Click on the Create box to create the hard disc drive.

The drive still needs to be partitioned and formatted. To set up a new hard disc drive, read the section entitled *Creating a second hard disc drive* on page 30.

If you try to specify a hard disc file that does not exist, a warning is displayed when you start the emulator.

If a file representing a PC hard disc exists, but the emulator has not been configured for it, rather than type the filename into the dialogue box you can drag the file itself into the disc drive filename field in the dialogue box (click in the Hard disc drive files box to add a disc first).


Click here to add a disc.

Type the disc size in here.

Type in the required pathname here.

Click here to create the DOS disc.
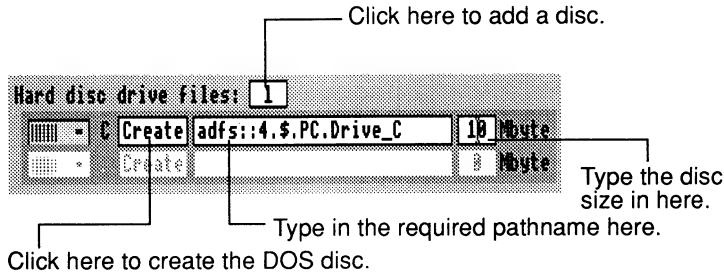
Display adaptors (multitasking only)

Although there are several different types of display adaptors available, most users should simply choose **EGA**. If you have a multi-frequency or VGA-compatible monitor you can choose EGA monitor **ECD**, in all other cases choose **CD**. You should also choose the least amount of EGA memory needed to run your program; most run with **128K**. However some applications need **256K** to run properly.

Click Select on the adaptor name to select the adaptor required. To disable an adaptor, click Adjust on the highlighted option.

The chosen display should be the simplest that is suitable, as this will use the least RISC OS memory. CGA uses the least memory, followed by EGA and VGA.

EGA Monitor types

With the EGA display you can specify the monitor type it is connected to. The choice is either CD (Colour Display) or ECD (Enhanced Colour Display). CD should be chosen if you have a medium-resolution monitor. If you have a multi-frequency or VGA-compatible monitor you can choose ECD.
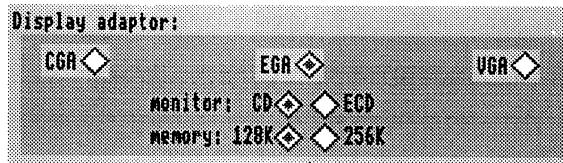
Select monitor and memory
size here (EGA only)

EGA memory

With the EGA display you can specify the amount of memory to be used in the emulation of the adaptor. You should specify the least amount of memory that will allow the PC program to run. Most programs will run with 128K of memory. Increasing the memory used by the graphics adaptor will increase the amount of RISC OS memory needed to run the emulator.

Startup text

This option will only work correctly if you are booting from a DOS hard disc file.

This option allows you to define an action for the computer to perform after it has booted up correctly. The startup text can be any valid DOS command.

For example, to display the directory you would type in DIR|M. Always use |M to end a command (instead of pressing Return).

Don't use this option to type in long lines of commands, it is far better to use this option to start a DOS batch file operation.

Single task only (multitasking only)

This option allows you to start the emulator full screen, without the option of using the emulator in a window. Once in full screen mode you can return to the RISC OS desktop by clicking on Menu (the middle mouse button. You can then click on the Emulator icon again to return to DOS.

The advantage of this option is that substantially less RISC OS memory is used by the emulator.

Erase RISC OS? (single tasking only)

Clicking on this option maximises the memory available to DOS. Using this option gives you approximately 600K of memory on a 1MB computer. If you don't use this option you get about 450K of memory on a 1MB computer.
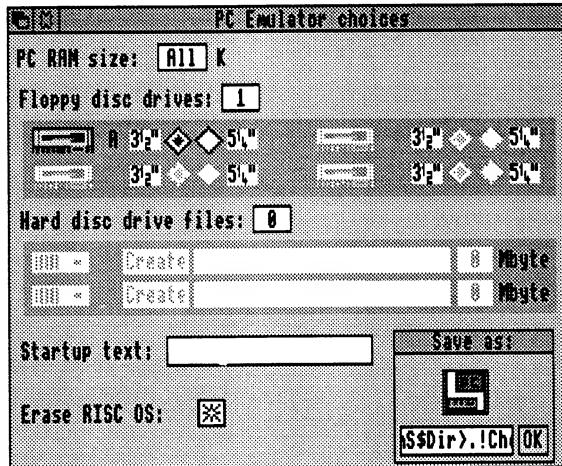
The option frees up memory by removing all applications you were running under RISC OS and by deleting non-essential RISC OS modules. Make sure you save anything you want to keep **before** you run the emulator using this option.

If you use this option, the only way to return to RISC OS is to restart the computer.

The list of modules that are deleted from memory by this option can be found in the file !PCEmS.GenBoot.!Modules. Do not change this file unless you know what you are doing.

Note that if your DOS hard disc partition is placed across a network, then the Erase RISC OS option should not be used because it will remove from memory modules needed by the network. This can result in the machine hanging. (Expert users can edit the list of modules killed in the file !PCEmS.GenBoot.Modules3.)

Saving the configuration

Once you have decided which options to use, click on the **Save as** box. This saves your configuration in a file called **!Choices** in the PC Emulator directory. The emulator will now always use these saved options.

Saving different configurations

Although !Choices is the standard file in which to save your configuration, you can save the configuration in any file. Type a new filename into the Save as box and then drag the icon to a directory. The file has a special PC icon.

To use this configuration file, make sure that RISC OS has 'seen' the PC Emulator application, then double-click on the configuration file icon. This starts the emulator with the parameters stored in the configuration file.
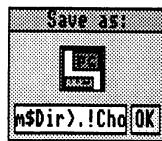
You can have multiple configuration files each set up with a different configuration. Double-clicking on the configuration file will start up the emulator with the right configuration.

Creating a second hard disc drive

To create an additional hard disc, load the emulator, but before you start DOS, choose **Configuration** from the icon bar menu, and increase the number of hard disc drive files by one. Check the path name and the desired size of the new hard disc drive file.

Click on the adjacent **Create** button for the **new** drive. There will be a delay while the drive is created.

Save the new configuration by clicking on the **Save as** OK button.

Start the PC Emulator by clicking on the emulator icon, and follow the following instructions to partition and format the new hard disc drive:

Warning: **Follow this section carefully, to avoid the risk of formatting your existing drive.**

1   Type

    FDISK

2   You will be asked if you want to initialize (format) the new drive. Type

    Y

    to confirm that you do.

3   You will be asked to enter your desired option from a list of choices. Type

    4

    to choose Select alternate fixed disk. This will select the new hard disc drive.

4   At the next prompt, type

    1

    to create a DOS partition on the disc, and

    1

    again to make a **primary** DOS partition.

5   You will then be asked if you want to use all the cylinders (space on the new hard disc) for the DOS partition. Type

Y

to confirm that you do. The disc partition will then be formatted. When this is complete, you will be prompted for a disc label – a name for the new hard disc – and you can type one in if you do. Press Return to continue.

6   Press **Esc** to exit from FDISK.

You will see the message:

```
The operating system needs to be reloaded.
Insert a system disc into A: and strike a key.
```

Restart the operating system by pressing the Return key.

Using DOS files with the RISC OS Filer

This chapter shows you how to use the RISC OS Filer in conjunction with DOS floppy discs and DOS hard disc files. You should understand how to use the Filer before you read this chapter. For more information about using the Filer read the RISC OS 3 *User Guide*.

Using DOS discs

As well as using the standard RISC OS formats for floppy discs, you can also use floppy discs formatted using the standard DOS formats.

DOS-formatted discs can be used in exactly the same way as RISC OS-formatted discs; just put them in the disc drive and click on the floppy disc icon to view them. This feature is especially useful if you want to move files between RISC OS and DOS computers.

The menu options available for DOS files and directories are exactly the same as those for RISC OS files and directories. Files can be copied and moved between RISC OS and DOS directories in the normal way. You can only **run** DOS applications from within the emulator.

Transferring text files

Transferring RISC OS text files to a DOS computer

If you save RISC OS files to a DOS-formatted floppy disc you can transfer the files to a DOS computer simply by taking the floppy disc and reading it in a DOS computer.

You should be able to read text files (those created by Edit). However 'top-bit set' characters are not supported. In practice this means that all the letters you can type on the keyboard, except the £ sign, will be readable. Most characters generated using !Chars will not be readable and may be translated into different characters when read on a DOS computer.

Binary and other non-text files will probably not be readable on a DOS computer.

Transferring text files from a DOS computer to RISC OS

You can transfer files from a DOS computer to RISC OS by taking the files stored on a DOS-formatted floppy disc and reading it on a RISC OS computer.

The same restrictions apply in that only standard characters will be readable. The £ sign will not be readable nor will any 'top-bit set' characters. In practice this means that all the characters you can type on the keyboard except the £ sign will be readable.

Some DOS word processors end each line with a carriage return and a line feed; this makes text look double-spaced when it is read into Edit. This can be cured easily by using Edit to replace the carriage returns with nothing.

Translating file names and access rights

Translating file names between DOS and RISC OS

RISC OS file names are limited to 10 characters without an extension whilst DOS names are limited to eight characters with a three letter extension. The DOS interpretation of special characters is also different. File names are therefore mapped as follows:

● When copying from RISC OS to a DOS disc, names are truncated to eight characters. For example Configure becomes CONFIGUR. The RISC OS filetype of an object is preserved.

- When copying from a DOS disc to RISC OS the filename, including the extension is truncated to 10 characters. One of the characters will be a '/' which is added to separate the filename from the extension. For example, AUTOEXEC.BAT becomes AUTOEXEC/B.

- File names are only truncated if the command *Configure Truncate is set to **on,** which it is by default. If *Configure Truncate is set to **off**, an error is generated.

Translating file names between DOS floppy discs and DOS hard disc files.

When copying from one DOS disc to another DOS disc (or a DOS hard disc partition), file names are never truncated. All eight characters, the dot separator and the three character extension are copied. However, when looking at the files in a directory display, only the first 10 characters are displayed and the 'dot' separator is displayed as a '/'.

File access rights

Since there is not a complete mapping between RISC OS file attributes and those provided by DOS, access rights are set as follows:

- A RISC OS file which is locked will be **read only** under DOS.

- A DOS file which is **read only** will be locked under RISC OS.

DOS file icons

If you display a disc that contains DOS files, the RISC OS Filer displays them with this icon.

You can copy DOS files onto any RISC OS floppy or hard disc; the files retain their DOS filetype and are not translated in any way.

If you wish, you can assign RISC OS file types to DOS file types using the *DosMap command. This will, for example, let you assign DOS files with the extension TXT the RISC OS filetype Text. For more information refer to the DosMap command in the RISC OS 3 *User Guide*.

Accessing DOS hard disc files

If you have a DOS hard disc file that you created using the PC Emulator, you can use the Filer to treat the file as a normal directory. This will allow you to access the DOS files in a RISC OS directory display. The DOS hard disc file must have the file type 'DOSDisc'.

Double-click on the icon to display the files on your DOS hard disc.

If you have used the DR DOS SuperStor utility, the RISC OS Filer will treat the SuperStor partition as a single file. The Filer will not be able to access files within the SuperStor partition.

Copying and moving DOS hard disc files

If you wish to copy or move your hard disc file, it will be copied or moved as a single file, not as a series of files and directories.

If you wish to copy it as files and directories, double-click on the DOS directory icon, and then copy the files from within it.

Deleting DOS hard disc files

If you wish to delete your hard disc file, the Delete option on the filer will delete it as a single file (not as a directory).

You should be very careful not to accidentally delete your hard disc file.

Formatting DOS discs with the RISC OS Filer

The RISC OS Filer will format the following DOS floppy disc types:

● **DOS 1.44M.** This IBM format stores up to 1.44MB of data. The disc can be read from and written to by any DOS computer with a high density 3.5" disc drive.

36

- **DOS 720K**. This IBM format stores up to 720K of data.

    The disc can be read from and written to by any DOS computer with a 3.5" disc drive.

- **DOS 1.2M**. This IBM format stores up to 1.2MB of data.

    It requires an IBM PC/AT type 5.25" disc drive attached externally. The disc can be read from and written to by any DOS computer with a high density 5.25" disc drive. High density floppy discs (1.2MB IBM type discs) must be used. Contact your supplier for more information on using external 5.25" disc drives.

- **DOS 360K**. This IBM format stores up to 360K of data.

    It requires a standard 5.25" disc drive attached externally. The disc can be read from and written to by any DOS computer with a 5.25" disc drive. Contact your supplier for more information on using external 5.25" disc drives.

If you don't know how to use the Filer to format floppy discs you should read the chapter *Discs, networks and filing systems* in the RISC OS 3 *User Guide*.

Acorn DOS utilities

All of the Acorn DOS utilities are supplied as part of the DR DOS disc set. If you have installed DR DOS onto your hard disc, these utilities will be stored in the C:\DRDOS directory.

The mouse driver

AMOUSE.COM is a Microsoft compatible mouse device driver. You will need this program if you are running a program that needs a mouse.

Load the mouse driver by typing AMOUSE at the DOS prompt. This should be done before starting a program that requires a mouse with a Microsoft compatible mouse driver. Alternatively, add the line AMOUSE.COM to the AUTOEXEC.BAT file. This will load the mouse driver every time you boot the emulator.

If you are working with the emulator in a window and running a program which uses the mouse, you should connect the mouse by using the **Connect mouse** option on the emulator window menu.

Some DOS programs use the mouse hardware directly and not via the mouse driver. These programs still work correctly as the hardware of a Microsoft bus mouse is also emulated. Therefore AMOUSE.COM need not be run.

The expanded memory device driver

EMS.SYS is an expanded memory device driver. You will need to use this if you run a program that needs expanded memory.

If you wish to use expanded memory put the following line in your CONFIG.SYS file (if you have a hard disc):

```
DEVICE=C:\DRDOS\EMS.SYS
```

If you have a floppy disc system put in the line:

```
DEVICE=EMS.SYS
```

When you want to use expanded memory you should fill in the required amount in the **LIM EMS size** box in the Configuration dialogue box.

The PC Emulator supports the LIM EMS 3.2 type of expanded memory.

The CD-ROM driver

The CD-ROM driver CDFS_DRV.SYS is included so that you can use the emulator with a CD-ROM device. Before you can use the CD-ROM device you must also purchase and install the Microsoft MS-DOS CD-ROM extensions. Read the documentation accompanying your MS-DOS CD-ROM extensions for more information.

The device driver

The DOS device driver CDFS_DRV.SYS can be configured by entering the following statement in CONFIG.SYS (if you have a hard disc drive):

```
DEVICE=C:\DRDOS\CDFS_DRV.SYS /D:MSCD001 /N:n
```

If you have a floppy disc system put in the line:

```
DEVICE=CDFS_DRV.SYS /D:MSCD001 /N:n
```

Where n is the maximum number of drives that can be accessed from the PC Emulator. If you have more than n drives actually connected, only the first n drives will be accessible. The parameter /D: is the name of the device driver, and should not be changed unless a corresponding change is made for MSCDEX.EXE.

MS-DOS CD-ROM extensions

The file containing the MS-DOS CD-ROM extensions is called MSCDEX.EXE. This can be configured by entering a statement into AUTOEXEC.BAT; for example (assuming you have a hard disc):

```
C:\DRDOS\MSCDEX /D:MSCD001 /L:F
```

where MSCD001 is the name of the device driver (see above), and F is the drive letter assigned to the CD-ROM drive.

Other parameters are:

/M: The number of cache buffers for MSCDEX.EXE (8-15), the default being 8.

/V: Display verbose message during boot-up, detailing memory usage and diagnostic information.

/S: Patch the operating system to permit CD-ROM drive sharing on an MS-NET based network server (for information only – not implemented under the PC Emulator).

/D: Specifies the CD-ROM device driver name, as for CDFS_DRV.SYS.

/L: Assigns the drive letter of the first CD-ROM drive.

/E: MSCDEX.EXE makes use of extended memory, if this is available.

Transferring files between DOS and RISC OS

This section has now been superseded. You can now transfer files easily using the RISC OS 3 Filer. For more information about the Filer, read the chapter entitled Using DOS files with the RISC OS Filer on page 33.

If you are using the single tasking emulator, PCEmS, together with the Erase RISC OS? option, use the following commands to transfer files between DOS and RISC OS without having to restart your computer and return to RISC OS.

The GETFILE and PUTFILE utilities are used to transfer files between the DOS and RISC OS filing systems. They are used from within the PC Emulator at the DOS prompt. Normally it is easier to use the RISC OS Filer, but these utilities may be useful in DOS batch files and are included for compatibility with previous versions of the PC Emulator.

The utility GETFILE allows the transfer of files from RISC OS to DOS and has the following syntax:

```
GETFILE <RISC OS source filename> <DOS destination filename>
```

For example:

```
GETFILE ADFS::FD.$.LETTERS.BANK A:\LETTERS\BANK.DOC
```

The utility PUTFILE allows the transfer of files from DOS to RISC OS and has the following syntax:

```
PUTFILE <DOS source filename> <RISC OS destination filename>
```

For example:

```
PUTFILE A:\SHEET\ACCOUNT.SHT ADFS::FD.$.SHEET.ACCOUNT
```

Using GETFILE and PUTFILE on single floppy drive systems

If you are using the single tasking emulator, PCEmS, together with the Erase RISC OS? option, you can use a DOS RAM disc to transfer files between a RISC OS floppy disc and DOS floppy disc.

Using a DOS RAM disc to transfer files.

1   Start up the PC Emulator and DOS.

2   Make sure that the DOS Startup/Install disc is unprotected.

3   From the A> prompt type:

```
ECHO DEVICE=VDISK.SYS >> \CONFIG.SYS
```

4   Re-boot the PC Emulator by holding down the Ctrl and Alt keys and pressing and releasing the Delete key.

5   The screen will clear and you will get a message saying that a RAM disc has been created on drive C.

With the RAM disc created you can now start to copy files between ADFS and DOS. First copy the GETFILE or PUTFILE programs into the RAM disc, using

```
A>C:
C>COPY A:PUTFILE.EXE C:
C>COPY A:GETFILE.EXE C:
```

If you are transferring files from ADFS, you can now put the ADFS disc into the drive and type, for example:

`C>GETFILE ADFS::FD.$.MYFILE MYFILE.DOC`

If you are putting files onto an ADFS disc, first copy the files from your DOS disc into the RAM disc and then use PUTFILE to transfer them to the ADFS disc.

44

DR DOS commands

This chapter describes some of the most commonly-used DR DOS commands. These and all the other DR DOS commands are described in full in the DR DOS 6.0 *User Guide*.

CD (or CHDIR)

CD (or CHDIR) is used to change the current directory. For example:

```
A>CD A:\LETTERS
```

changes the current directory of drive A to the directory LETTERS in the root directory of drive A. The following example:

```
A>CD B:\BILLS\GAS
```

changes the current directory of drive B to the directory GAS in the directory BILLS on drive B.

To return to the root directory, type

```
CD \
```

To go up a level, type

```
CD..
```

CHKDSK

CHKDSK is used to check that a disc is correctly set up. It displays the total amount of space on the disc, the amount of unused space remaining and the number of files stored. In addition to this, CHKDSK displays the amount of memory the emulator makes available as PC memory and the amount of that which is free for applications. For example:

```
A>CHKDSK /V
```

lists all files and their paths.

```
A>CHKDSK /F
```

allows you to fix any problems that have been identified.

CLS

CLS is used to clear the screen.

COPY

COPY is used to copy files or directories between drives on the system. For example:

```
A>COPY B:TEST.COM
```

copies TEST.COM from drive B to the current directory of drive A, while:

```
A>COPY B:\LETTERS B:\BILLS
```

copies the contents of the directory LETTERS on drive B to the directory BILLS on drive B.

DISKCOPY

DISKCOPY copies the contents of the floppy disc in the source drive to a formatted or unformatted floppy disc in the target drive. For example:

```
A>DISKCOPY A: B:
```

copies the contents of the disc in A to the disc in B. In the case of a system with a single floppy drive, A: and B: are the same physical drive and you are prompted to change discs as necessary.

DATE

DATE returns the system date and prompts for a new date to be entered. Note that the default date format is American, ie MM/DD/YY. If you do not want to change the date, just press Return.

DIR

DIR is used to catalogue the current directory. DIR on its own lists the files one per line. The following example:

```
A>DIR B: /W
```

lists the files on drive B. The /W denotes that they are displayed five per line.

ERASE (or DEL)

ERASE allows you to delete files from a disc (an alternative form is DEL). For example:

```
A>ERASE *.COM
```

erases all files with the .COM extension, while:

```
A>ERASE B:\TEST
```

erases all files in the TEST directory on drive B.

```
A>ERASE *.*
```

erases all files in the current directory.

FORMAT

FORMAT is used to prepare new blank floppy discs to store data and programs on. For example:

```
A>FORMAT B:
```

formats the disc in drive B. You will be prompted to insert the new disc before formatting starts.

```
A>FORMAT A: /S
```

formats the disc in drive A and copies the system files onto the disc, so making it bootable.

47

MKDIR (or MD)

MKDIR (or MD) is used to create new directories on the disc. For example:

```
A>MKDIR BILLS
```

creates a directory called BILLS from the current directory, while:

```
A>MD B:\TEST
```

creates a directory called TEST from the root on drive B.

RENAME (or REN)

RENAME allows you to change the name of a file. For example:

```
A>REN BILLS OLDBILLS
```

renames the file BILLS to one called OLDBILLS.

RMDIR (or RD)

RMDIR deletes a directory from the disc. The directory must be empty before it can be deleted. For example:

```
A>RMDIR LETTERS
```

deletes the directory called LETTERS on the current drive (A).

TIME

TIME returns the system time and prompts for a new time to be entered. If you do not need to change the time, just press Return.

TYPE

TYPE allows you to display the contents of a text file on the screen. For example:

```
A>TYPE B:MYFILE.DOC
```

displays the contents of MYFILE.DOC on drive B.

XCOPY

XCOPY copies complete directories, subdirectories and files. For example:

```
A>XCOPY ARCHIVE B:
```

copies the file ARCHIVE to the B drive.

```
A>XCOPY APPS B: /S
```

copies the directory APPS and any lower level subdirectories and files onto the B drive. It does not copy empty directories.

Appendix A: The PC Emulator

Compatibility

The compatibility of the emulator is very good. Many well known DOS titles have been tested and operate correctly; though not necessarily with DR DOS 6.0. These include:

- Database:
  - DBase IV
  - Retrieve
  - Neris
  - Simis
- Spreadsheet:
  - Excel
  - Lotus 123 V2.1
  - SuperCalc 4
  - Symphony
  - MS Works
- Publishing:
  - Timeworks
  - Ventura 2.0
  - DeskPress 1.01
- Word processing:
  - Brief
  - MS Word V5
  - Wordstar Prof V6
  - WordPerfect
- Planning:
  - PC Planner
  - BYL

- Communications:
  - Crosstalk
  - Procomm
  - DR DOS FileLink
- Programming:
  - MS MASM
  - MS C V5
  - Quick C
  - GWBasic
  - Turbo Pascal V5
  - SmallTalk/V
  - ProFORTRAN77
- Graphical user interfaces:
  - Windows 3
  - GEM 3
  - DR DOS ViewMax
- Operating systems:
  - MS-DOS 3.21 (but must use DRIVPARM = /D:0 /F:2)
  - MS-DOS 3.30
  - DR DOS 3.41
  - DR DOS 5.0
  - DR DOS 6.0

However, it is not possible to run all of these on a single-floppy drive or 1MB computer, as some require VGA (and hence a 2MB computer), while others have been designed to be run from a hard disc and will not fit on a 720K or 1.44MB floppy disc. Check with your Acorn supplier as to the suitability of your system for particular DOS titles.

Application configuration options

If the PC application you are using allows any configuration options on how to address the screen, typically called Direct and BIOS, then choose BIOS. ProComm is one such application.

If the application offers a choice in performing scrolling, then do not select hardware scrolling. Locoscript is one such application.

Harvard Graphics Desktop Publisher (HGDP.EXE)

If the PC Emulator is switched from single tasking to multitasking mode or vice-versa while HGDP.EXE is running, all screen output will cease. Therefore it is recommended that the single tasking is selected before HGDP.EXE is run and remained in until HGDP.EXE is exited.

The emulated PC – a technical description

For some DOS applications (particularly during installation), it is necessary to know the exact nature of the PC and what attached devices the PC Emulator emulates.

The emulated PC is basically an IBM PC XT, but in more detail the emulated PC contains the following components:

- Intel 80188 processor chip
- Intel 8087 maths coprocessor chip
- Intel 8259 interrupt controller chip
- Intel 8253 timer chip
- Intel 8237 DMA chip
- Intel 8255 IO chip
- Sound connected via 8255 chip

- Enhanced 101 key US layout keyboard connected via 8255 chip
- Serial interface (Intel 8250 chip)
- Parallel interface (output only)
- 3.5 inch 720K/1.44MB floppy disc (BIOS level only)
- External 5.25 inch 360K floppy disc (BIOS level only)
- Hard disc (BIOS level only)
- Real time clock (BIOS level only)
- CGA
- EGA (not PCEmS)
- VGA (not PCEmS)
- Additional screen mode 0x6A (800x600 4bpp) (not PCEmS)
- Two-button Microsoft bus mouse
- Conventional memory (max 640KB)
- Expanded memory (max 4MB) using LIM 3.2 (not PCEmS)
- ROM BIOS.

Some PC devices are only emulated at the BIOS level. This means that the hardware of the device is not emulated, only the BIOS interface to the device. DOS programs that attempt to access the hard disc IO ports will fail because they are not emulated, but DOS programs that access the hard disc via the BIOS will work correctly. Other devices are emulated at the hardware level, for example, the graphics adaptors. Programs that access the graphics adaptor hardware directly will work correctly.

Unsupported features

- Programs written for 80286, 80386 and later processors.
- EGA screen blanking not supported.
- EGA smooth scrolling not supported.
- EGA Print screen (screen dump) is not supported.
- EGA does not support plane chaining. The consequence is that in 64K mode certain PC screen modes are unavailable.

53

- Some limitations in sound emulation.

- DMA chip is not fully implemented.

- Blinking text is not supported.

- Long start-up texts in the configuration file may fail. Use the start-up text to run a .BAT file.

- MS-DOS 3.21 and MS-DOS 3.30 can access only two configured hard disc partitions. DR DOS 3.41, DR DOS 5.0 and DR DOS 6.0 can access four (although the DR DOS FDISK program will only recognise two at a time).

Editing the !Choices file directly

This section is for experts only! Most people won't need to edit their emulator choices file in this way.

The configuration that you chose using the Configuration window is saved in the file !Choices. This is a plain text file and can be altered using !Edit. The only reason you may want to do this is to make an installation that is not directly available from the Configuration window.

The only three options that are not directly available are:

- Options for a third and fourth DOS hard disc file.

- Attaching external 80-track 5.25 inch floppy disc drives.

- Specifying the 64K memory option for EGA memory.

Use of four DOS hard disc partition files

Although the configuration dialogue box only contains slots for two hard disc partition files, it is possible to attach up to four DOS hard disc partition files. Note that this is only useful under DR DOS. To add extra hard disc files, modify the !Choices file using Edit, and add additional lines starting with the keyword `HardDisc`.

For example:

```
HardDisc        adfs::4.$.PCEmulator.Drive_C
HardDisc        adfs::4.$.PCEmulator.Drive_D
HardDisc        adfs::4.$.PCEmulator.Drive_E
HardDisc        adfs::4.$.PCEmulator.Drive_F
```

Using external 80-track 5.25 inch floppy disc drives

Under RISC OS 3 it is possible to use an external 80-track double-density 5.25 inch floppy disc drive to read and write DOS 360K discs, by forcing the head to be double-stepped. Note that this is not possible under RISC OS 2.

The PC Emulator can be made to do this by adding the keyword DoubleStep to the Floppy configuration line in the !Choices file. The !Choices file can be edited directly in !Edit. To display !Choices, hold down Shift and double-click on !PCEm. Load Edit and drag !Choices over Edit's icon bar icon. The file will be displayed in an Edit window.

For a machine with an internal 3.5 inch floppy and one external 80 track 5.25 inch floppy, the !Choices file should contain the lines

```
# floppy disc drives:
Floppy 3.5
Floppy 5.25 DoubleStep
```

Specifying the 64K memory option for EGA memory

You can specify the 64K memory option for use with the EGA graphics adaptor; however it is not recommended. Amend the !Choices file so that the Memory size to be allocated to display adaptor is 64K. For example:

```
# Memory size to be allocated to display adaptor
Adaptor memory 64K
```

Possible problem areas

Low memory

On 2MB machines, there is often only just enough room to run !PCEm. If the emulator is short of memory, changing RISC OS screen mode can cause problems. The PC Emulator tries to offer a reduced functionality black and white only window in the event that it hasn't sufficient memory. This allows the emulator to continue running until more memory is made available to it. It is recommended that on a 2MB computer the emulator is started while in RISC OS screen mode 27 and that the RISC OS screen mode isn't changed.

The emulator will also use substantially less RISC OS memory if the **Single Task only** option is chosen in the PC Configuration dialogue box. See page 28 for more information.

Sound emulation

The PC Emulator cannot successfully emulate complex sound generation, such as lengthy tunes or synthesised speech. Using the sound facilities provided in some programs (for example, *The Guinness Disc of Records* CD ROM) can cause the emulator to hang.

Formatting double-density floppies at high density

It is often possible to format, at high density, floppy discs that are only double-density. This should be avoided as such formatted discs may not be read reliably on PC-compatible computers. For reliable data transfer between your computer and PC-compatibles, it is best to format high-density floppies at high density (1.44MB). Note that high density (1.44MB) is the default format under the PC Emulator.

CGA Emulation in single-tasking mode

Some monitors (and televisions via the TV modulator) will not operate correctly when run with a CGA display in single-tasking mode (this is the only option with the single tasking emulator). This is due to the field rate being 60Hz.

To cure this problem you should:

1   Load Edit onto the icon bar.

2   Open the application directory by holding down the Shift key and double-clicking over the PCEm (or PCEmS) icon in the directory window.

3   Drag the file !Run onto the Edit icon. This display the contents of the file.

4   Comment out the lines in the !Run file that read:

    RMEnsure ModesCGA 1.00 RMLoad <Obey$Dir>.ModesCGA

    RMEnsure ModesCGA 1.00 Error Requires ModesCGA
    1.00 (ModesCGA) or later

To comment out these lines, type in the bar character (|) at the start of the lines so that the lines now read:

```
|RMEnsure ModesCGA 1.00 RMLoad <Obey$Dir>.ModesCGA

|RMEnsure ModesCGA 1.00 Error Requires ModesCGA
1.00 (ModesCGA) or later
```

5 Press F12 to access the command line. Type in:

```
RMKill ModesCGA
```

6 Press Return twice to display the desktop.

If you don't understand this procedure, contact your dealer for help.

This procedure removes the special 200 line screen mode and the CGA display will now use the standard 256 line screen mode; this results in a slightly smaller screen area.

Screen colours

When working in windowed mode, particularly in a 16-colour RISC OS mode (for example, mode 12), the DOS colours will often not be mapped correctly. This is because the 16 colours used by RISC OS are not the same colours used by DOS. This is less apparent in a 256-colour RISC OS mode (such as mode 15). The colours will be mapped correctly in single-tasking mode. The 256 colour VGA mode 19 will have slight colour errors as RISC OS does not give 256 independent colours, which VGA requires.

EGA and VGA Compatibility

The EGA and VGA graphics adaptors are very complex devices and it is possible to configure them in many ways other than the standard BIOS supported screen modes. It is possible that some PC programs (games) using such non-standard register configurations, may not behave correctly.

Parallel port

The parallel port supports output only.

Copy protection

In general, copy protected software will not run on the emulator.

The restrictions on the parallel port mean that software titles which employ copy-protection via this port may not run.

Similarly, other titles using certain methods of floppy disc protection will not work under the emulator.

Keyboard configuration

Within DOS, the default keyboard configuration is that of a US keyboard, and this is the recommended configuration (the keyboard resembles a US style keyboard more than a UK style keyboard). Computers with keyboards designed for use in other countries should be configured to that country.

To configure your keyboard for another country use the DOS utility program KEYB.COM

With the default US keyboard layout, the key to the left of the backspace key has no effect. To enter the £ symbol, hold down Alt and type 1 5 6 on the numeric keypad.

The serial interface

Always configure any serial communications packages to use hardware handshaking. Do not use XON/XOFF handshaking (this is likely to fail because of the extra layer of buffering provided by RISC OS between the PC application and the serial chip).

When using serial communications the emulator should be in single task mode (in multitasking mode, other RISC OS applications may deny the PC Emulator enough computer power to emulate the serial chip fast enough).

Baud rates

With hardware handshaking enabled and operating in single-tasking mode the emulator can operate at up to 9600 baud (although the actual transfer rate will be considerably lower).

Without handshaking the maximum data rate is 300 baud.

Talking to a serial printer

Use an IBM AT to serial printer cable.

Talking to a modem

With a modem the signals are wired straight through; therefore an IBM AT to modem cable will usually work. This should be wired as follows:

Acorn computer 9-way D-type (female)		Modem 25-way D-type (male)	
Pin	Signal	Signal	Pin
1 ←	DCD ————— DCD	→	1
2 →	RXD ————— RXD	→	2
3 →	TXD ————— TXD	←	3
4 →	DTR ————— DTR	←	4
5	GND ————— GND		5
6 ←	DSR ————— DSR	→	6
7 →	RTS ————— RTS	←	7
8 ←	CTS ————— CTS	→	8
9 ←	RI ————— RI	→	9

Talking to another PC

The following cable will allow communication between two Acorn computers, two IBM ATs, or between an Acorn computer and an AT:

Acorn or PC-AT 9-way D-type (female)		Acorn or PC-AT 9-way D-type (female)	
Pin	Signal	Signal	Pin
1 ←	DCD	DCD	→ 1
2 →	RXD	RXD	→ 2
3 →	TXD	TXD	← 3
4 →	DTR	DTR	← 4
5	GND	GND	5
6 ←	DSR	DSR	→ 6
7 →	RTS	RTS	← 7
8 ←	CTS	CTS	→ 8
9 ←	RI	RI	→ 9

Talking to another PC (earlier Acorn computers)

For Acorn computers prior to the A5000, A3010 and A3020 (i.e.
Archimedes A300 series, A440, A400/1 and A540 series, and the BBC
A3000) the following serial cable wiring is recommended

Acorn or PC-AT 9-way D-type (female)		Acorn or PC-AT 9-way D-type (female)	
Pin	Signal	Signal	Pin
1 ←	⌐ DCD	DCD ⌐ →	1
2 ←	RXD ─────✕───── RXD	→	2
3 →	TXD ═══════✕═══════ TXD	←	3
4 →	⌐ DTR	DTR ⌐ ←	4
5	GND	GND	5
6 ←	DSR ─────✕───── DSR	→	6
7 →	RTS ═══════✕═══════ RTS	←	7
8 ←	⌐ CTS	CTS ⌐ →	8
9 ←	RI	RI →	9

62

Appendix B: Programming details

Access to RISC OS

DOS programs can gain access to RISC OS by using a special (new SVC) 8086 opcode. This is an opcode that is unused on a real 8086 but the PC Emulator traps and uses it to communicate with RISC OS. The utility programs GETFILE.EXE and PUTFILE.EXE use this SVC opcode to transfer files between the RISC OS and MS-DOS filing systems. There is also a PC I/O mapped device that allows RISC OS events to be seen by the PC and can cause the PC program to be interrupted if required.

The SVC Opcode

The new pseudo 8086 SVC opcode has the following format:

```
FF FF nn nn
```

It is four bytes long, the first two bytes being hexadecimal FFFF, the third and fourth bytes being a 16-bit number that indicates to the emulator what service is required. For example, the SVC opcode to translate an 8086 address to an ARM address could be assembled in Microsoft MASM using:

```
dw -1,257
```

Only a few of the possible SVC numbers are actually used. Not all of the numbers that are used are described here, as many are used for internal purposes. Only those SVC numbers described below should be used by a DOS application.

SVC 257

Translate 8086 address to ARM address.

On entry

ES:BX   8086 address

On exit

DX:AX   32 bit ARM address
CY = 1 if error
CY = 0 if okay

SVC 258

General purpose SWI.

On entry

DX:AX = 'safe' (DH='s', AL='e')
ES:BX = pointer to parameter block

Parameter block (must be dword, ie 4 byte, aligned)

dword 0   SWI number
dword 1   R0
dword 2   R1 ...
dword 15 R14
dword 16 R15 (*flags only, does not contain the* PC)

On exit

If the carry (CY) flag is clear, the parameter block is valid. In this case if the V flag in the returned R15 is clear the SWI was executed successfully and the parameter block will be updated with the values in the registers returned by the SWI. If the V flag was set, then the SWI failed.

If the carry flag is set, the parameter block is malformed. The top bit (bit 31) of the SWI number will be set, and the remainder of the SWI number will contain an error code:

64

0 – general failure

1 – invalid signature

2 – command block not in user RAM

3 – alignment error

4 – SWI number is out of range

5 – SWI number is protected

The RISC OS PC Device

This is a PC I/O mapped device at PC ports 0x700 and 0x701. It allows RISC OS events to be seen by the PC emulator.

An ARM Event 13 will generate a PC IRQ3. These will be queued (up to at least four entries). The RISC OS PC device allows the 8086 to examine the event registers.

Port 700H

Read

bit 0   set if interrupt requested

bit 1   set if overrun (event buffer overflowed)

Write

bits 0 - 1   select byte within word (00 = LSB of word)

bits 2 - 5   latched register contents (r0 to r15) (only registers 0 to 2 can be read)

bit 6   must be zero (reserved)

bit 7   clears interrupt status, enables subsequent events

Port 701H

Read only

Gives the ARM register content at the time of Event 13 being queued. The byte that is read is determined by writing to port 700H (see above).

Index

*Configure Truncate 35
*DosMap command 36
£ sign 34, 58
1MB computer 4, 9, 52
3.5" disc drive 37
5.25" floppy drive 25, 37, 54
8086 opcode 63

A

access rights 34
ADFS default file name 11
AMQUSE.COM 18, 39

B

backups 2
batch files 41
baud rates 58
BIOS level support 53
boot disk 6
booting
      from DOS hard disc 18,
            19

C

C> prompt 19
CD monitor 5, 10, 26
CDFS_DRV.SYS 40

CD-ROM driver 40
CD-ROM extensions 40
CGA display 1
CGA Emulation in single
            tasking mode 56
!Choices file 23, 29
      editing directly 54
compatibility of emulator 51
CONFIG.SYS file 25
configuration
      dialogue box 23
      menu options 21
      saving the 12, 29
configuring
      the emulator 23
Connect mouse option 10, 39
copy protection 58
copying DOS files 35
country and keyboard
            settings 6, 14
Customer Services vi

D

Display adaptors 26
DOS commands
      CD 45
      CHKDSK 45
      CLS 46
      COPY 46

viewing DOS files vi

W

windowed mode 21
working copies of floppy
        discs 7

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